

From: [Casey, Carolyn](#)
To: [Craig Ziady](#)
Cc: ["Bruce Hoskins"; "Stephen Drohosky"; Johnson, Stephen \(DEP\); Miano, John \(DEP\); Wainberg, Daniel; Donahue, Patricia \(DEP\)](#)
Subject: RE: Cummings Center, Beverly, MA/former USM site IDA
Date: Monday, September 30, 2013 1:35:00 PM
Attachments: [Review of indoor air -united shoe machinery Cumming Sept 27.pdf](#)
[Attach 2 USM Indoor Air Data review.pdf](#)

Please see the attached technical review comments on the indoor air sampling. I do not have attachment 1 but will send it along ASAP.

Thanks

Carolyn

From: Casey, Carolyn
Sent: Thursday, September 19, 2013 2:52 PM
To: 'Craig Ziady'
Cc: 'Bruce Hoskins'; 'Stephen Drohosky'; 'Johnson, Stephen (DEP)'; 'Miano, John (DEP)'; Wainberg, Daniel
Subject: FW: Cummings Center, Beverly, MA/former USM site IDA

As a follow-up to the attached email, below, I just spoke with Jack Miano from the Mass DEP and based on his review of the additional older soil gas sampling data from the 2008 AUL addendum and the indoor air data, it does appear as though the primary concern from a risk perspective is with the petroleum fractions.

We also discussed the need for an additional round of indoor air sampling as soon as possible to evaluate any changes since the modification of the ventilation system. Another round of IDA sampling is needed in the winter. Soil gas sampling should also be conducted immediately following the indoor air sampling, consistent with the VI guidance. Despite the above evaluation, the next two rounds should include both the petroleum fractions and TO-15.

Also, an ambient outdoor air sample should be collected in the same location as before but also a sample should be placed between the gas station located off-site to the east of Bldg 100 and bldg 100. Another ambient air sample could be placed near the ponds/wooded area, away from all the cars, etc.

Please let me know if we need to discuss this further on a conference call with DEP.

Thanks

Carolyn

From: Casey, Carolyn
Sent: Wednesday, August 28, 2013 3:11 PM
To: 'Craig Ziady'
Cc: 'Bruce Hoskins'; 'Stephen Drohosky'
Subject: RE: Cummings Center, Beverly, MA

Summer has been enjoyable but much too short. Hope you have all had the chance for some vacation and are all enjoying the summer as well.

I was recently looking for the 2008 AUL amendment and cannot find the appendices which includes the figures, table and lab reports. Is there some reason this was not submitted to the DEP in electronic format? May have been prior to when they started requiring electronic files. Nonetheless, I cannot find it scanned in to the system so maybe it's buried in another document. I did just see a paper copy that the DEP has in Wilmington but it appear to be mixed in with the 2006 amendment and could be missing information. Do you have a complete electronic version that can be submitted to DEP and could you also please send me a copy too? If not, could you please send me a paper copy.

Regarding the sampling frequency and/or time of year to sample, I would suggest using the MA DEP guidance. Sampling under the most conservative conditions would be in the winter but considering the sensitive population, guidance suggests more frequent sampling. The following is cut and pasted from 12/11 MassDEP VI Guidance...

Table 2-1: Conditions for Sampling Indoor Air Parameter	Most Conservative Conditions	Least Conservative Conditions
Season	Late winter/early spring	Summer
Temperature	Indoor 10°F > than outdoors	Indoor temp < outdoor temp.
Wind	Steady, > ~5 mph	Calm
Soil	Saturated with rain or frozen	Dry
Groundwater	High water table	Low water table
Pressure	Indoor > Outdoor	Indoor < Outdoor
Doors/Windows	Closed	Open
Heating System	Operating	Off

MassDEP recommends greater sampling frequency for more sensitive receptors. For daycares, schools, and residences, MassDEP recommends that at least two to four indoor air sampling rounds be conducted, depending on the degree of subsurface contamination, before determining that the vapor intrusion pathway does not exist. For commercial and industrial buildings, two indoor air sampling rounds are recommended to provide sufficient information to make decisions regarding vapor intrusion. In order to obtain an estimate of long-term conditions (chronic exposure), the sampling rounds should be obtained over at least two different seasons, one of which is winter.

From: Craig Ziady [<mailto:craig@cummings.com>]

Sent: Friday, August 23, 2013 12:43 PM

To: Casey, Carolyn

Cc: 'Bruce Hoskins'; 'Stephen Drohosky'

Subject: Cummings Center, Beverly, MA

Hi Carolyn – I hope you are enjoying the summer. In response to your recent email relating to Cummings Center, we submit the following:

Our information and documents reveal that several tanks, including tank T19, appear to have been removed sometime between 1988 and 1991. Although we have not been able to locate any contemporaneous documentation regarding the removal, this fact is not terribly surprising given that the removal not only predated the implementation of licensed site professionals but also occurred outside of the Massachusetts Contingency Plan process. We anticipated that we might be able to locate records of the removal at the Beverly Fire Department, but BFD had no such records. We also tried at the Beverly Historical Society, but we had no luck there either.

Your question about the HVAC system prompted us to re-survey the system in and around Suite 157-J. In doing so, we discovered that most of the fresh air for the heat pump units serving Suite 157-J came from an air intake located on the first floor of the West elevation, directly at the truck loading dock outside of Suite 159J. Since the HVAC system does not allow for such air intake to be selectively turned off without disrupting the system, we decided to vertically re-route the system this month so that the fresh air intake now draws fresh air at rooftop-level (i.e., instead of from the truck loading dock).

Given the foregoing, including particularly the relocation of the air intake serving Suite 157-J, we intend to resample the indoor air at Suite 157-J, likely by repeating the 24-hour composite event,

before we determine if any sub-slab sampling is advisable. Do you have a particular preference on the time of year that such resample takes place?

Thanks very much.

Craig

Craig J. Ziady

General Counsel

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Reduce ... Reuse ... Recycle

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**Technical Review of the *Indoor Air Sampling Analysis and
Risk Characterization Report***
Former United Shoe Machinery Division North Parcel
181 Elliot Street, Beverly, MA
Dated May 24, 2013
EPA ID # MAD043415991
Mass DEP RTN 3-610

General Comments

1) A list of contaminants of concern (COCs) from the site assessment and remediation conducted in the 1980s would be useful. Please provide a list of COCs detected in both soils and groundwater.

2) The EPA's review of the indoor air sampling results and risk assessment identified the following issues. The risk assessment:

- is not comprehensive
- is not entirely site specific,
- does not provide cumulative risk,
- presents arguments to minimize the risk using a variety of approaches, but the data provided is insufficient to support the arguments presented, and
- did not achieve reporting limits that were less than the screening levels for multiple contaminants.

3) Despite the issues identified, the risk assessment is sufficient for a preliminary estimate of risk due to vapor intrusion. Based on the two sampling events, the Hazard Quotient is calculated at a value of less than one and therefore, the noncancer risks are not sufficiently high to require an immediate action (refer to specific comments 12 and 14, below).

4) The total cancer risk calculated is 2×10^{-5} for Suites 157-J and 149-J, and Buildings 600 and 500. The cancer risks are within EPA's risk range. EPA's policy is explained in OSWER Directive 9355.0-30, Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions, April 22, 1991. EPA uses the risk range of 10^{-6} to 10^{-4} as a "target range" within which EPA tries to manage risks as part of a site cleanup. Once a decision has been made to take an action, EPA has a policy to work towards a cleanup that will achieve a 10^{-6} risk or lower; however, EPA could accept a cleanup anywhere in the risk range. Factors that influence the determination of the appropriate risk include the presence of sensitive receptors. At this site the cancer risk is 2×10^{-5} ; however, the site contains two daycare facilities, two schools, and an adult daycare. Children are at a sensitive period of development for air exposures and adults in daycare could be expected to have respiratory or liver issues that may impair their ability to deal with excess indoor air contaminants.

<http://www.epa.gov/oswer/riskassessment/pdf/baseline.pdf>

5) To improve the risk assessment to more accurately reflect the current and future risk:

- Conduct additional rounds of indoor air sampling;
- Achieve reporting limits that are less than the screening levels;
- Refine the Conceptual Site Model (e.g., consider other potential sources, etc.); and
- Use more site specific exposure factors to improve the accuracy of the risk calculations.

Nine compounds exceeded the EPA's and MA DEP's residential screening levels. Consider evaluating whether it would be more cost efficient to improve the building ventilation, remediate with a sub-slab soil ventilation system, or revert back to the Activity and Use Limitations. Remediation may be more efficient than expending a lot of effort on collecting additional indoor air and soil gas sampling data to improve the site investigation and improve the risk assessment in order to make a final remedy decision. The limited soil gas sampling investigation that was conducted in order to eliminate the AUL appears insufficient or may not represent current conditions.

From the MassDEP Interim Final Vapor Intrusion Guidance, December 2011, "MassDEP recommends greater sampling frequency for more sensitive receptors. For daycares, schools, and residences, MassDEP recommends that at least two to four indoor air sampling rounds be conducted, depending on the degree of subsurface contamination, before determining that the vapor intrusion pathway does not exist. For commercial and industrial buildings, two indoor air sampling rounds are recommended to provide sufficient information to make decisions regarding vapor intrusion. In order to obtain an estimate of long-term conditions (chronic exposure), the sampling rounds should be obtained over at least two different seasons, one of which is winter."

6) There are 30 contaminants of concern that were detected in both indoor air and soil gas sampling. It is noted that sampling of these two media was not conducted concurrently as guidance recommends but several years apart. Guidance recommends concurrent sampling of groundwater, soil gas, and indoor air in order to evaluate the indoor air pathway using multiple lines of evidence. Because of the inherent uncertainty with the sampling and analytical and risk assessment processes for the indoor air pathway, a final remedy would likely require a more thorough evaluation of this pathway or remediation to eliminate the pathway.

7) Please submit the complete set of field notes for both sampling events.

8) Please provide documentation showing that a soil management plan was used when the parking garage was constructed and excavation in front lobby of building 100 was conducted.

Specific Comments

3.2 Air Sample Collection

1) For the previous indoor air sampling, please provide additional documentation on the placement of the canisters, including height. Canisters should be placed at a height that is representative of the typical breathing zone level of the children. Indoor air samples should be

collected in locations where children spend the majority of their day. Please provide copies of photographs showing canister locations.

2) If sample disturbance is a possible issue, sampling should take place on the weekends when the facilities are closed.

3) For any subsequent sampling events, consider the need for multiple canisters per school/day care. There are a number of factors that go into deciding how many and where samples need to be collected to effectively represent indoor air quality relative to the source of interest. The number of locations selected depends on factors such as, but not limited to: how the building is being used, who is occupying the building, whether there are any areas where soil gas can migrate into the building, where individuals spend most of their time and what the buildings HVAC system is and how it circulates air in the building.

5.0 Summary of Air Sampling Results

4) On page 11, cis-1,2-dichloroethylene is missing from the list of compounds “detected in indoor air and not in historic soil gas samples.” Please add this constituent to the list.

5) Page 11 contains the following statement:

“The primary site contaminants during site assessment and remediation conducted in the 1980s and 1990s consisted of chlorinated solvents and petroleum hydrocarbons. 11 compounds that had been detected in historic soil gas samples were not detected in the indoor air. Several of these 11 compounds are related to chlorinated solvents and/or their degradation products, most notably trichloroethylene, 1,1-dichloroethane, and 1,1-dichloroethene which were detected during the 1980s site assessment. As these compounds were not detected in indoor air in any of the sampling locations, this is an indication that vapor intrusion is not occurring within the buildings at the site.”

Contrary to the above statement, 28 constituents and all 3 APH fractions detected in both indoor air and soil gas may indicate that vapor intrusion is occurring.

Regarding the site assessment in 1980's discussed on page 11. The assessment included the installation of 139 groundwater monitoring wells, most of which were only sampled once. This line of evidence used in making decisions on vapor intrusion is lacking. Soil sampling in the 1980s was not as reliable as it is now with respect to identifying volatile organics due to the lack of standard operating procedures for preserving the samples; this line of evidence may also be lacking.

6) The site investigation should be improved by obtaining soil gas sampling data immediately following the additional rounds of indoor air sampling. In addition to sub slab sampling, sampling in the underground utility corridors, if accessible, would provide valuable information. Less expensive soil gas sampling can be conducted by locating cracks in the floors (may be

visible in utility closets and other areas that are not carpeted) and locations where utilities enter the building (vapor intrusion pathways).

7) The last paragraph on page 11 states that "...the majority of these compounds are not related to the petroleum and solvent compounds identified during the 1980's site assessment and appear to be unrelated to the former USM operations." A number of the compounds detected in indoor air are components of petroleum products (USM constituents of concern), including the trimethylbenzenes that were detected in both indoor air and soil gas.

Section 6.0 Risk Characterization

Section 6.2.3 Calculation of Exposure Dose, page 13

8) EPA prefers to see some supporting documentation or references for the parameters chosen for the calculation of exposure. The parameters should be as site specific as possible. EPA requires two risk calculations—one using central tendency parameters and a second using high end parameters. At a minimum, the calculations need the high end parameters because EPA makes decisions based upon the individual who experiences the Reasonable Maximum Exposure (RME).

9) The exposure frequency of 12 hours a day is unsupported. The value chosen appears greater than the central tendency; it is not clear how it relates to high end exposure.

10) The exposure duration of 250 days is unsupported although logical. If an employee works for 250 days per year would their child be in day care for the same number of days? The value chosen appears greater than the central tendency; it is not clear how it relates to high end exposure. For example, a representation of high end exposure based on data from the daycare facilities and schools at the site could be used here. If there is difficulty obtaining this site specific information due to privacy issues, published data from schools in Massachusetts could be used.

Section 6.2.4 Exposure Points and Exposure Point Concentrations, page 14

11) The use of one-half the detection limit is acceptable for the chemicals for which there was at least one detect in any of the data collected over the two sampling events. Given the limited sampling, it would be more appropriate to use the detection limit to represent the non-detect results for the seven chemicals that were never detected in the indoor sampling results and where the reporting limits exceeded the screening levels.

Section 6.4 Characterization of risk of Harm to Human Health

Section 6.4.1 Methodology, page 15

12) EPA guidance suggests that the Hazard Indices be separated by target organ or system. However, the Hazard Quotient would still be less than one.

Section 8.0 Conclusions and Recommendations

13) Page 22 of this section states the following, “While there was no evidence of storage of petroleum compounds during the pre-screening assessment in September 2012 in Suite 157-J, there are multiple commercial products that, if present at the space, could have resulted in the elevated levels detected in the air samples. For instance, the presence of cigarette smoke-related compounds on workers’ clothing could result in hydrocarbon detection in the air samples. If this statement is referring to the day care workers, they could be questioned as to whether or not they smoke and if so, sampling on a Saturday or Sunday may eliminate this questionable source. Alternately, or in addition, other possible sources to consider are (1) sub-slab vapor intrusion, (2) present or former underground storage tanks (3) adjacent suite usage of COCs (i.e., is there still an autobody shop and/or diesel mechanics shops in the north-east and north-west corners, respectively, of building 100?). Refer to attachment 1.

14) **Tables 3 to 7.** Please note that EPA guidance suggests the use of a sub chronic reference concentration (RfC) of 7×10^{-2} ug/m³ for 1,2,4-trimethylbenzene. This would result in a Hazard Quotient below one for this chemical.

15) **Tables 3 to 7.** The cancer risks may be slightly higher than calculated because ½ the detection limit was used where the RL was greater than screening level. Risk Assessment Guidance for Superfund, Part A (1989) states that other substitutions for non-detects can be used in the risk assessment (e.g., the detection limit). Given the limited indoor air data collected, the use of the detection limit rather than ½ the detection limit in the risk calculations for those chemicals where the RL was greater than the screening level would be appropriate. The rationale provided for including these chemicals in the risk assessment is sound.

Figures

16) Please provide a north arrow on figures 4-7.

17) Please revise figures 4 through 7 to show the entire day care/school facility floor plan and to be consistent with figure 3.

Additional Recommendations

18) The risk characterization looked at only one pathway of exposure. All risk assessments should be comprehensive and include all exposures and pathways for calculation of cumulative risk. Typically young children engage in a lot of hand to mouth activity so the incidental ingestion and dermal pathways must also be included in the risk assessment for a final remedy.

19) The impact of vehicle exhaust on the indoor air sampling should be considered and discussed in the report. In addition, other potential sources such as underground storage tank releases, and those more likely than “cigarette smoke on workers clothing” should be discussed. It would also be useful to include a discussion of what is typically found in indoor air and provide a complete reference to any such studies used in the discussion.

20) The reference location chosen for air sampling is likely contaminated with car exhaust and diesel exhaust from the commuter rail. It would be preferable to have at least one reference location that is not impacted by excessive exhaust. The car and train exhaust represent an alternative source of contamination rather than typical background. The grassy areas near the pond and buildings 500 and 600 would provide an alternate location impacted by anthropogenic background and less exhaust. In addition, a sample in this area is likely more representative of background conditions for buildings 500 and 600.

Another ambient outdoor air sample may be appropriate between building 100 and the gas station located off-site to the east of the Cummings Center.

21) Regarding the data evaluation for additional rounds of indoor air sampling, please include an analysis similar to what is provided in Attachment 2.

Appendices

22) On pages 67 of 74 and 75 of 82, custody seals on the canisters are noted as absent. Please clarify why. This could bring into question the integrity of the samples.

23) The chain of custody form shows that samples were relinquished by someone (name illegible) on 2/6/13 but not received until 2/7/13 (name and time illegible). This could bring into question the integrity of the samples.

24) Regarding the March 27, 2013 Memorandum from the lab on the field duplicate analysis (below), why wasn't the sample run again if it is possible there was an error with aliquot removal?

“It should be noted that acceptable RPDs for field duplicates are less than 40% for compounds whose detected values are greater than five times the estimated quantitation limit (EQL); and for compounds whose detected values are less than five times the EQL, value differences between the field sample and its associated duplicate are to be less than 2.5 times the EQL. Based on these criteria, the RPDs for the compounds listed above are acceptable except for 1,2,4-Trimethylbenzene, Acetone, Ethanol, Isopropyl Alcohol, m/p-Xylenes, Styrene, and C9-C12 Aliphatics. Of note is that based on the analysis results, the quantitative results for sample L1302224-02 were consistently lower than the results for sample L1302224-01, meaning there may have been a malfunction in the canister for L1302224-02 or in the sample aliquot removal in the laboratory allowing ambient air to dilute the collected sample. No significant issues with the canisters were noted in the field data or in the analytical analysis report.”

ATTACHMENT 1

Figure 5 Phase II Comprehensive Site Assessment June 1991

ATTACHMENT 2
Evaluation Completed by MassDEP

**Beverly
United Shoe Machine
181 Elliot Street
RTN 3-610
RTN 3-14836**

MassDEP
August 16, 2013

Review of Indoor Air Data

- Indoor Air Sampling Analysis & Risk Characterization Report, May 24, 2013
- Risk Characterization, (Soil Vapor 2004 Sampling Data), January 2005
- Report on Soil Vapor Survey Results, Suite 130Q – 100 Cummings Center, July 2003

The boxed lists of volatile organic compounds below, are those that are present in both soil gas and indoor air. The italicized headings of each box indicate the likely status based on a comparison of the indoor air levels, soil vapor levels, and Residential Threshold Values.

Building 100 is the location of the Bright Horizons Children's Center and the Futures Behavior Therapy Center. Building 600 is the location of the Beverly Children's Center and therefore Critical Exposure Pathways may apply at these locations, and it appears reasonable to use the MassDEP Residential Threshold Values (TVs) to evaluate levels of site contaminants in indoor air in buildings 100 and 600.

The conclusions section of the 2013 Risk Characterization recognized the elevated levels of petroleum fractions in buildings 100 and 600. The report concludes that elevated levels of petroleum fractions are likely from indoor sources and recommends a product inventory and re-sampling of Building 100. It seems the same recommendations could be applied to building 600 based on a level of C5-C8 petroleum fraction in indoor air (100 ug/m³) exceeding the Residential Threshold Value (TV), and C5-C8 soil vapor at 1660 ug/m³. Although the levels of C5-C8 soil vapor beneath building 600 do not exceed the Residential Soil Vapor Screening Value (4100 ug/m³), this potential vapor intrusion issue would benefit from further evaluation because C5-C8 is present in both soil vapor and indoor air.

Needs further evaluation exceeds TVs

C5-C8 - exceeds TV in indoor air, in soil vapor Bldg 100 indoor air, S-157 C5-C8 = 320 ug/m ³ Bldg 600 indoor air, S-171, C5-C8 = 100 ug/m ³ C9-C12- exceeds TV in indoor air, in soil vapor Bldg 100 indoor air, S-149 C9-C12 = 110 ug/m ³ Bldg 600 indoor air, S-171, C9-C12 = 71 ug/m ³ C9-C10 - exceeds TV in indoor air, in soil vapor Bldg 100 indoor air, S-157 C9-10 = 160 ug/m ³

(soil vapor bldg 600 c5-c8 = 1660 ug/m3)
 (soil vapor bldg 500 c5-c8 = 2200 ug/m3)
 (soil vapor bldg 100 volatile petroleum hydrocarbons = not detected)

Cyclohexane - in soil vapor and indoor air (no TVs, use APH)
 Hexane - in soil vapor, no TV, in indoor air, use APH
 Heptane - in soil vapor, no TV, use APH, in indoor air
 Trimethylbenzene - in soil vapor and indoor air (no TVs, use APH)

May be due to vapor intrusion, but HI very low

Tetrahydrofuran - in soil vapor, no TV, in indoor air 0.7 ug/m3, (10 ug/m3 max in soil vapor)
 Hazard Index for 0.7 ug/m3, HI = 0.0004. (RFC = 2 mg/m3)

Depending upon 2 additional confirmatory rounds, no action needed soil vapor levels low compared to indoor levels

Ethanol - in soil vapor, no TV, in indoor air (3 ug/m3 max in soil vapor)
 Isopropyl alcohol - in soil vapor, no TV, in indoor air (35 ug/m3 max in soil vapor)

Depending upon 2 additional confirmatory rounds, no action needed less than TVs

Methylene Chloride - in soil vapor, exceeds TV in indoor air (BLD 100 S157, Bld 500 S1100), same as outdoor air roof sample
 Trichlorofluoromethane - in soil vapor, in indoor air, no TV, levels same in outdoor air
 Freon 113 and Freon 114 in indoor at about 0.5 ug/m3, but not in soil vapor
 Bromodichloromethane - in soil vapor, avg of 2 dups in indoor air (0.1435) equal to the TV
 1,1,1-TCA – in soil vapor, less than TV in indoor air
 1,3-butadiene - in soil vapor, no TV, in indoor air
 2-butanone – in soil vapor, less than TV in indoor air
 Acetone – in soil vapor, less than TV in indoor air
 Benzene - in soil vapor, less than TV in indoor air
 Chloroform - in soil vapor, less than TV in indoor air
 Ethylbenzene - in soil vapor, less than TV in indoor air
 Xylenes - in soil vapor, less than TV in indoor air
 Naphthalene - in soil vapor, less than TV in indoor air
 Tetrachloroethene - in soil vapor, less than TV in indoor air
 Toluene - in soil vapor, less than TV in indoor air